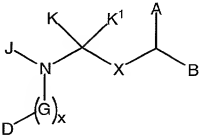
CLAIMS

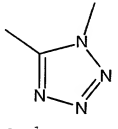
1. A compound having formula (I):



(I)

and pharmaceutically acceptable derivatives thereof, wherein:

X is selected from $-CH_2CH_2-$, $-CH=CH-$, $-C(OH)CH_2-$, $-CH_2C(OH)-$, $=C(F)CH_2-$, $-C(F)=CH_2-$, $-NHC(O)-$, $-P(O)(OH)CH_2-$, $-CH_2SO_2-$, $-C(S)NR^1-$, $-C(O)CH_2CH(OH)-$, $-C(OH)CF_2-$, $-C(O)CF_2-$, $-CH(F)CH_2-$, $-C(F)_2CH_2-$,



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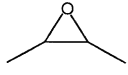

A, B and R^1 are independently E, (C_1-C_{10})-straight or branched alkyl, (C_2-C_{10})-straight or branched alkenyl or alkynyl, or (C_5-C_7)-cycloalkyl or cycloalkenyl; wherein 1 or 2 hydrogen atoms in said alkyl, alkenyl or alkynyl are optionally and independently replaced with E, (C_5-C_7)-cycloalkyl or cycloalkenyl; and wherein 1 to 2 of the $-CH_2-$ groups in said alkyl, alkenyl, or alkynyl groups is optionally and independently replaced by -O-, -S-, $-S(O)-$, $-S(O)_2-$, =N-, -N= or $-N(R^3)-$;

or, B and R^1 are independently hydrogen;

R^3 is hydrogen, (C_1-C_4)-straight or branched alkyl, (C_3-C_4)-straight or branched alkenyl or alkynyl, or (C_1-C_4) bridging alkyl, wherein a bridge is formed between the nitrogen atom to which said R^3 is bound and any carbon atom of said alkyl, alkenyl or alkynyl to form a ring, and wherein said ring is optionally benzofused;

E is a saturated, partially saturated or unsaturated, or aromatic monocyclic or bicyclic ring system, wherein each ring comprises 5 to 7 ring atoms independently selected from C, N, $N(R^3)$, O, S, S(O), or $S(O)_2$; and wherein no more than 4 ring atoms are selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$;

wherein 1 to 4 hydrogen atoms in E are optionally and independently replaced with halogen, hydroxyl, hydroxymethyl, nitro, SO_3H, trifluoromethyl, trifluoromethoxy, (C_1-C_6)-straight or branched alkyl, (C_2-C_6)-straight or branched alkenyl, O-[(C_1-C_6)-straight or branched alkyl], O-[(C_3-C_6)-straight or branched alkenyl], $(CH_2)_n-N(R^4)(R^5)$, $(CH_2)_n-NH(R^4)-(CH_2)_n-Z$, $(CH_2)_n-N(R^4-(CH_2)_n-Z)(R^5-(CH_2)_n-Z)$, $(CH_2)_n-Z$, O-$(CH_2)_n-Z$, $(CH_2)_n-O-Z$, S-$(CH_2)_n-Z$, CH=CH-Z, 1,2-methylenedioxy, C(O)OH, C(O)O-[(C_1-C_6)-straight or branched alkyl], C(O)O-$(CH_2)_n-Z$ or C(O)-$N(R^4)(R^5)$;

each of R^4 and R^5 are independently hydrogen, (C_1-C_6)-straight or branched alkyl, (C_3-C_5)-straight or branched alkenyl, or wherein R^4 and R^5, when bound to the same nitrogen atom, are taken together with the nitrogen atom to form a 5 or 6 membered ring, wherein said ring optionally contains 1 to 3 additional heteroatoms independently selected from N, $N(R^3)$, O, S, S(O), or

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$S(O)_2$; wherein said alkyl, alkenyl or alkynyl groups in R_4 and R_5 are optionally substituted with Z.

each n is independently 0 to 4;

each Z is independently selected from a saturated, partially saturated or unsaturated, monocyclic or bicyclic ring system, wherein each ring comprises 5 to 7 ring atoms independently selected from C, N, $N(R^3)$, O, S, S(O), or $S(O)_2$; and wherein no more than 4 ring atoms are selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$;

wherein 1 to 4 hydrogen atoms in Z are optionally and independently replaced with halo, hydroxy, nitro, cyano, C(O)OH, $(C_1\text{-}C_3)$-straight or branched alkyl, O-$(C_1\text{-}C_3)$-straight or branched alkyl, C(O)O-[$(C_1\text{-}C_3)$-straight or branched alkyl], amino, NH[$(C_1\text{-}C_3)$-straight or branched alkyl], or N-[$(C_1\text{-}C_3)$-straight or branched alkyl$]_2$;

J is H, methyl, ethyl or benzyl;

K and K^1 are independently selected from $(C_1\text{-}C_6)$-straight or branched alkyl, $(C_2\text{-}C_6)$-straight or branched alkenyl or alkynyl, or cyclohexylmethyl, wherein 1 to 2 hydrogen atoms in said alkyl, alkenyl or alkynyl is optionally and independently replaced with E;

wherein K and K^1 are independently and optionally substituted with up to 3 substituents selected from halogen, OH, O-$(C_1\text{-}C_6)$-alkyl, O-(CH_2)n-Z, NO_2, C(O)OH, C(O)-O-$(C_1\text{-}C_6)$-alkyl, $C(O)NR^4R^5$, NR^4R^5 and $(CH_2)_n$-Z; or,

J and K, taken together with the nitrogen and carbon atom to which they are respectively bound, form a 5-7 membered heterocyclic ring, optionally containing up to 3 additional heteroatoms selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$, wherein 1 to 4 hydrogen atoms in said

heterocyclic ring are optionally and independently replaced with (C_1-C_6)-straight or branched alkyl, (C_2-C_6)-straight or branched alkenyl or alkynyl, oxo, hydroxyl or Z; and wherein any $-CH_2-$ group in said alkyl, alkenyl or alkynyl substituent is optionally and independently replaced by -O-, -S-, -S(O)-, $-S(O_2)-$, =N-, -N=, or $-N(R^3)-$; and wherein said heterocyclic ring is optionally fused with E;

G, when present, is $-S(O)_2-$, -C(O)-, $-S(O)_2-Y-$, -C(O)-Y-, -C(O)-C(O)-, or -C(O)-C(O)-Y-;

Y is oxygen, or $N(R^6)$;

wherein R^6 is hydrogen, E, (C_1-C_6)-straight or branched alkyl, (C_3-C_6)-straight or branched alkenyl or alkynyl; or wherein R^6 and D are taken together with the atoms to which they are bound to form a 5 to 7 membered ring system wherein said ring optionally contains 1 to 3 additional heteroatoms independently selected from O, S, N, $N(R^3)$, SO, or SO_2; and wherein said ring is optionally benzofused;

D is hydrogen, (C_1-C_7)-straight or branched alkyl, (C_2-C_7)-straight or branched alkenyl or alkynyl, (C_5-C_7)-cycloalkyl or cycloalkenyl optionally substituted with (C_1-C_6)-straight or branched alkyl or (C_2-C_7)-straight or branched alkenyl or alkynyl, $[(C_1-C_7)$-alkyl]-E, $[(C_2-C_7)$-alkenyl or alkynyl]-E, or E;

wherein 1 to 2 of the CH_2 groups of said alkyl, alkenyl or alkynyl chains in D is optionally replaced by -O-, -S-, -S(O)-, $-S(O_2)-$, =N-, -N=, or $-N(R^3)$;

provided that when J is hydrogen or G is selected from $-S(O)_2-$, C(O)C(O)-, SO_2-Y, C(O)-Y, or C(O)C(O)-Y, wherein Y is O; then D is not hydrogen; and

x is 0 or 1.

2. The compound according to claim 1, wherein:

each of A and B is independently selected from $-CH_2-CH_2-E$ or $-CH_2-CH_2-CH_2-E$; and

E is a monocyclic or bicyclic aromatic ring system, wherein said ring comprises 5-7 ring atoms independently selected from C, N, $N(R^3)$, O, S, S(O), or $S(O)_2$, and wherein 1 to 4 ring atoms are independently selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$;

wherein 1 to 4 hydrogen atoms in E are optionally and independently replaced with halogen, hydroxyl, hydroxymethyl, nitro, SO_3H, trifluoromethyl, trifluoromethoxy, (C_1-C_6)-straight or branched alkyl, (C_2-C_6)-straight or branched alkenyl, $O-[(C_1-C_6)$-straight or branched alkyl], $O-[(C_3-C_6)$-straight or branched alkenyl], $(CH_2)_n-N(R^4)(R^5)$, $(CH_2)_n-NH(R^4)-(CH_2)_n-Z$, $(CH_2)_n-N(R^4-(CH_2)_n-Z)(R^5-(CH_2)_n-Z)$, $(CH_2)_n-Z$, $O-(CH_2)_n-Z$, $(CH_2)_n-O-Z$, $S-(CH_2)_n-Z$, CH=CH-Z, 1,2-methylenedioxy, C(O)OH, or $C(O)-N(R^4)(R^5)$.

3. The compound according to claim 1 or 2, wherein D is an aromatic monocyclic or bicyclic ring system, wherein each ring comprises 5 to 7 ring atoms independently selected from C, N, $N(R^3)$, O, S, S(O), or $S(O)_2$; and wherein no more than 4 ring atoms are selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$.

4. The compound according to claim 3,

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wherein:

D is phenyl; and

x is 1.

5. The compound according to claim 4, wherein G is -C(O)C(O)-.

6. The compound according to claim 4, wherein G is $-SO_2-$.

7. The compound according to claim 4, wherein G is -C(O)-.

8. The compound according to claim 4, wherein G is -C(O)Y-.

9. The compound according to claim 1 or 2, wherein:

x is 0;

D is selected from (C_1-C_5)-straight or branched alkyl, or $[(C_1-C_3)$-straight or branched alkyl)]-E; and

E is an aromatic monocyclic or bicyclic ring system, wherein in said ring system each ring comprises 5 to 7 ring atoms independently selected from C, N, $N(R^3)$, O, S, S(O), or $S(O)_2$; and wherein no more than 4 ring atoms are selected from N, $N(R^3)$, O, S, S(O), or $S(O)_2$.

10. The compound according to claim 9, wherein E is phenyl.

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11. The compound according to claim 2, wherein each of A and B is independently selected from $-CH_2-CH_2-E$ or $-CH_2-CH_2-CH_2-E$; and

E is pyridyl.

12. A composition comprising a compound according to claim 1 and a pharmaceutically effective carrier.

13. The composition according to claim 12, further comprising a neurotrophic factor.

14. The composition according to claim 13, wherein said neurotrophic factor is selected from nerve growth factor (NGF), insulin-like growth factor (IGF-1) and its active truncated derivatives such as gIGF-1 and Des(1-3)IGF-I, acidic and basic fibroblast growth factor (aFGF and bFGF, respectively), platelet-derived growth factors (PDGF), brain-derived neurotrophic factor (BDNF), ciliary neurotrophic factors (CNTF), glial cell line-derived neurotrophic factor (GDNF), neurotrophin-3 (NT-3)and neurotrophin 4/5 (NT-4/5).

15. The composition according to claim 14, wherein said neurotrophic factor is nerve growth factor (NGF).

16. A method for stimulating neuronal regeneration or preventing neurodegeneration in a patient or in an *ex vivo* nerve cell, comprising the step of

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administering to said patient or said nerve cell a compound according to any one of claims 1-12.

17. The method according to claim 16, wherein said compound is administered to a patient and is formulated together with a pharmaceutically suitable carrier into a pharmaceutically acceptable composition.

18. The method according to claim 17, comprising the additional step of administering to said patient a neurotrophic factor either as part of a multiple dosage form together with said compound or as a separate dosage form.

19. The method according to claim 18, wherein said neurotrophic factor is selected from nerve growth factor (NGF), insulin-like growth factor (IGF-1) and its active truncated derivatives such as gIGF-1 and Des(1-3)IGF-I, acidic and basic fibroblast growth factor (aFGF and bFGF, respectively), platelet-derived growth factors (PDGF), brain-derived neurotrophic factor (BDNF), ciliary neurotrophic factors (CNTF), glial cell line-derived neurotrophic factor (GDNF), neurotrophin-3 (NT-3)and neurotrophin 4/5 (NT-4/5).

20. The method according to claim 19, wherein said neurotrophic factor is nerve growth factor (NGF).

21. The method according to claim 16, wherein said method is used to treat a patient suffering from a disease selected from trigeminal neuralgia,

glosspharyngeal neuralgia, Bell's Palsy, myasthenia gravis, muscular dystrophy, muscle injury, progressive muscular atrophy, progressive bulbar inherited muscular atrophy, herniated, ruptured, or prolapsed invertebrae disk syndrome's, cervical spondylosis, plexus disorders, thoracic outlet destruction syndromes, peripheral neuropathies, such as those caused by lead, dapsone, ticks, or porphyria, other peripheral myelin disorders, Alzheimer's disease, Gullain-Barre syndrome, Parkinson's disease and other Parkinsonian disorders, ALS, Tourette's syndrome, multiple sclerosis, other central myelin disorders, stroke and ischemia associated with stroke, neural paropathy, other neural degenerative diseases, motor neuron diseases, sciatic crush, neuropathy associated with diabetes, spinal cord injuries, facial nerve crush and other trauma, chemotherapy- and other medication-induced neuropathies, and Huntington's disease.

22. The method according to claim 16, wherein said method is used to stimulate neuronal regeneration in an *ex vivo* nerve cell.

23. The method according to claim 22, comprising the additional step of contacting said *ex vivo* nerve cell with a neurotrophic factor.

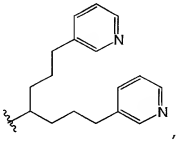
24. The method according to claim 23, wherein said neurotrophic factor is selected from nerve growth factor (NGF), insulin-like growth factor (IGF-1) and its active truncated derivatives such as gIGF-1 and

Des(1-3)IGF-I, acidic and basic fibroblast growth factor (aFGF and bFGF, respectively), platelet-derived growth factors (PDGF), brain-derived neurotrophic factor (BDNF), ciliary neurotrophic factors (CNTF), glial cell line-derived neurotrophic factor (GDNF), neurotrophin-3 (NT-3)and neurotrophin 4/5 (NT-4/5).

25. The method according to claim 24, wherein said neurotrophic factor is nerve growth factor (NGF).

26. The compound according to claim 1, wherein:

$-(G)_x-D$ is selected from $-CH_3$, $-CH_2CH_3$, $-C(=O)-CH_3$, $-CH_2-Ph$, $-C(=O)-Ph$, $-C(=O)-O-CH_2-Ph$ or $-C(=O)-C(=O)-Ph$, wherein Ph is phenyl; and

is selected from 

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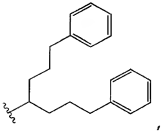
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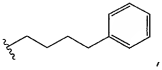
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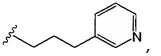

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